

A Meta-analysis of the Effect of Traditional Chinese Medicine Nursing Techniques on Blood Glucose Regulation in Prediabetic Population

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 7 July 2025 and was last updated on 7 July 2025.

INTRODUCTION

Review question / Objective P (Population - Research subjects): The American Diabetes Association defines the "prediabetic population" as having an HbA1c level of 5.7-6.4%, and it also cites diagnostic criteria (impaired fasting glucose or impaired glucose tolerance), and specifically mentions that it corresponds to the category of "pi dan" in traditional Chinese medicine. The inclusion criteria emphasize that the research subjects must meet the diagnostic standards of either the WHO or the ADA.
I (Intervention - Intervention Measures): A combination of traditional Chinese nursing techniques, including: non-pharmaceutical therapies: moxibustion, auricular point pressing, acupoint massage, press needling, five-tone therapy, etc.; behavioral intervention: syndrome differentiation-based dietary therapy, traditional exercises (Baduanjin, Shaolin Neigong), etc.

C (Comparison - Control Measures) All included studies were randomized controlled trials (RCTs).
O (Outcomes - Outcome Indicators): The main indicators are FPG, 2hPG, and HbA1c. All indicators are uniformly quantified using WMD/SMD.
S (Study design - Research Design) Firstly, the inclusion criteria were set as randomized controlled trials (RCTs). Then, the Cochrane bias risk assessment tool was used, with two independent reviewers screening the literature and extracting data. When the data heterogeneity was high, a random effects model was selected for analysis. Publication bias was tested using Begg's funnel plot, strictly following the requirements of evidence-based medicine.

Rationale Traditional Chinese medicine nursing emphasizes the concept of "preventing disease before it occurs", advocating comprehensive and individualized prevention and intervention before

the onset of disease. It aims to regulate the balance of yin and yang in the body, unblock meridians, and enhance the body's resistance and eliminate pathogenic factors through non-pharmaceutical means, thereby achieving a series of nursing methods for disease prevention, promoting recovery, and improving overall health. The core of this approach lies in the "holistic view" and "nursing based on syndrome differentiation", emphasizing individualized care tailored to the person, time, and place. This preventive nursing technique can not only effectively reduce the risk of diabetes but also help improve the overall health of patients.

Condition being studied Prediabetes is a transitional metabolic state between normal blood glucose and diabetes, characterized by impaired glucose regulation but not yet reaching the diagnostic threshold for diabetes. Epidemiological significance: Approximately 730 million adults worldwide are in this stage (IDF data from 2023), and without intervention, 70% will progress to type 2 diabetes.

Prediabetes falls within the category of "Spleen Dampness" and is first recorded in the "Huangdi Neijing - Treatise on Strange Diseases": "This is caused by excessive consumption of rich and fatty foods... and may develop into diabetes."

METHODS

Search strategy "Traditional Chinese Medicine Nursing and Prediabetes", "Moxibustion and Prediabetes", "Ear Acupoint Pressing and Prediabetes", "Acupuncture and Prediabetes", "Acupoint Massage and Prediabetes", "Pressing Needles and Prediabetes", "Dietary Care and Prediabetes", and English search terms such as "Acupuncture or moxibustion or pressing needles or acupoint massage or Dietary care and prediabetes".

Participant or population Disease status: For a clear diagnosis: Meets the internationally recognized prediabetes criteria (WHO/ADA). Impaired fasting glucose (IFG): FPG 6.1-6.9 mmol/L; Impaired glucose tolerance (IGT): OGTT 2hPG 7.8-11.0 mmol/L.

Intervention Traditional Chinese Medicine (TCM) nursing techniques / TCM non-pharmacological interventions, including but not limited to Auricular point pressing/plaster therapy; Moxibustion; Acupoint massage/acupressure; Cupping therapy; Acupoint application/sticking; Tai Chi; Baduanjin.

Comparator Routine care (usual care, standard health education, lifestyle advice), no intervention/blank control, placebo/sham control, other active non-TCM nursing interventions (e.g., exercise alone, diet education alone).

Study designs to be included (1) Inclusion criteria: 1) The research subjects are patients diagnosed with prediabetes; 2) The intervention measures are traditional Chinese medicine nursing techniques, including but not limited to acupuncture, moxibustion, acupoint application, auricular point embedding, traditional Chinese medicine exercises, etc.; 3) The research design is a randomized controlled trial; 4) The outcome indicators include at least two of the following: fasting blood glucose, 2-hour postprandial blood glucose, and glycated hemoglobin. (2) Exclusion criteria: 1) Review articles, observational studies such as.

Eligibility criteria Inclusion: Adults (≥ 18 years old) with a clear diagnosis of prediabetes (based on the adopted standards such as WHO 1999/2006, ADA 2023, etc.), regardless of gender, race, or region. The diagnosis is based on impaired fasting glucose (IFG), impaired glucose tolerance (IGT), or both (IFG/IGT). The main diagnostic criteria adopted should be specified.

Exclusion: Patients diagnosed with type 1 or type 2 diabetes, gestational diabetes, or secondary diabetes; patients with severe heart, brain, liver, kidney, or mental diseases, malignant tumors, or other diseases that may significantly affect glucose metabolism; patients who have used drugs or other intervention measures that significantly affect blood glucose in the study groups (unless the usage is balanced between the groups and the effects can be separated).

Information sources A comprehensive search was conducted in Pubmed, Medline, Embase, Science Citation Index (SCI), Cochrane, Springer, Chinese Biomedical Literature Database, Chinese Science and Technology Journal Full-text Database, China National Knowledge Infrastructure (CNKI) Journal Full-text Database, WanfangDatabase.

Main outcome(s) Change from baseline (or endpoint values) in Fasting Plasma Glucose (FPG); Change from baseline (or endpoint values) in 2-hour Postprandial Plasma Glucose (2hPG).

Quality assessment / Risk of bias analysis The Cochrane Collaboration's "Risk of Bias 2" (RoB 2) tool was used to assess the risk of bias in the included randomized controlled trials (RCTs). For

the included quasi-RCTs, the first period evaluation in RoB 2 for Crossover Trials (assessing the randomization stage) or the cautious use of ROBINS-I tool (as it is mainly used for non-randomized studies) was adopted.

The domains included randomization process, intervention deviation, missing data, outcome measurement, selective reporting of results, and other biases.

Two reviewers independently conducted the assessment. Each domain and the overall judgment were classified as "Low risk", "Some concerns", or "High risk". Disagreements were resolved through discussion or by a third reviewer.

The results were presented through tables and graphs (such as risk of bias summary tables/figures). The risk of bias assessment results will be considered in data synthesis and subgroup/sensitivity analyses.

Strategy of data synthesis Software: Statistical analysis was conducted using RevMan (Review Manager) version 5.4 or later.

Effect size: For continuous variable outcomes (FPG, 2hPG, HbA1c, etc.), mean difference (MD) or standardized mean difference (SMD) (when measurement tools/units are different), and their 95% confidence intervals (CI) were used. For dichotomous variable outcomes (negative conversion rate, progression rate, adverse event rate), risk ratio (RR) or odds ratio (OR) and their 95% CI were used.

Heterogeneity test: Chi-square test (Q test) and I^2 statistic were used to assess heterogeneity among studies. Significant heterogeneity was defined as $P < 0.10$ and $I^2 \geq 50\%$.

Combination model: If there was no significant heterogeneity ($I^2 < 50\%$, $P \geq 0.10$), a fixed-effect model was used for combined analysis. If significant heterogeneity existed ($I^2 \geq 50\%$ or $P < 0.10$), a random-effects model was used for combined analysis (usually using the inverse variance method, D-L method or S-D method).

Publication bias: If the number of included studies was ≥ 10 , a funnel plot was used in combination with Egger's linear regression method to test for publication bias.

Others: Forest plots were provided to display individual studies and combined effect sizes.

Subgroup analysis Subgroup analyses will be conducted to explore the sources of heterogeneity when significant heterogeneity is found (or pre-specified), including:

Intervention type: such as auricular acupressure vs. moxibustion vs. acupoint massage vs. Tai Chi, etc. (specific groupings will be determined based on the number and types of included studies).

Intervention duration: such as <12 weeks vs. ≥ 12 weeks.

Intervention frequency/intensity: such as high frequency (e.g., daily/every other day) vs. low frequency (e.g., weekly).

Control group type: such as routine care vs. no treatment control vs. placebo control vs. other active interventions.

Study location: China vs. other countries (if any).

Baseline blood glucose status: IFG vs. IGT vs. IFG/IGT (based on the enrollment conditions reported in the studies).

Study quality: low risk of bias vs. high risk/uncertain studies.

Subgroup differences will be tested using formal interaction tests (Test for subgroup differences).

Sensitivity analysis Conduct sensitivity analyses to assess the robustness of the results:

Exclude quasi-RCTs: Only use RCTs for the combined analysis.

Exclude studies with high risk of bias: Exclude studies that are rated as having a "high risk of bias" in the overall assessment or in key domains.

Switch data pooling models: Compare results from fixed-effect models versus random-effects models.

Effect size selection: Use SMD instead of MD (or vice versa) for key continuous outcomes.

Handling of missing data: Apply different methods to studies with missing data (e.g., exclusion vs. best/worst case estimates).

Exclude outlier studies (if any): Remove studies that are clearly deviant in the forest plot.

Country(ies) involved China.

Keywords Traditional Chinese Medicine nursing; TCM nursing techniques; Non-pharmacological therapy; Non-pharmacological intervention; Auricular acupressure; Auricular plaster therapy; Moxibustion; Acupressure; Acupoint massage.

Contributions of each author

Author 1 - meijing Wang - Literature search; Design the initial search strategy and determine the keyword combinations for major English databases (such as PubMed, Cochrane); Literature screening; Independently complete the initial screening of 50% of the titles/abstracts of the literature; independently conduct a full-text assessment of 100% of the literature that meets the initial screening.

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Author 2 - na lu - Literature Search ; Optimize the search strategy, and supplement Chinese databases (CNKI, Wanfang) and gray literature search plans. Literature Screening Independently complete the initial screening of 50% of the

literature titles/abstracts; independently conduct full-text evaluation of 100% of the literature that pass the initial screening. Data Extraction; Independently extract the following.
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